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PUBLIC HEALTH SERVICE

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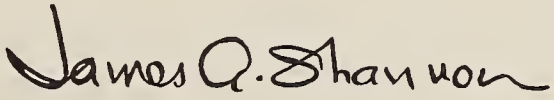
The National Institutes of Health, a bureau of the Public Health Service, supports medical research, research training, and construction of research facilities in the Nation's medical schools, universities, and other research centers. It also conducts laboratory and clinical research in its own facilities at Bethesda, Md., and in the field.

The programs of the seven Institutes are designed to obtain new medical scientific knowledge in order to control especially the major killing and crippling diseases of today, such as cancer, heart disease, arthritis, neurological disorders, and mental illness. The role of medical science in promoting better health and longer life is well recognized by the American people. Through continued research leading to increased understanding of the causes, prevention, and treatment of disease, we can become a healthier and stronger Nation.

We at the National Institutes of Health appreciate our great responsibility. We approach our work with humility, but with confidence that we can aid materially in man's conquest of disease.



James A. Shannon, M.D.,
Director, National Institutes of Health.

1798 President John Adams signs bill establishing Marine Hospital Service for merchant seamen.

1887 Research laboratory is founded at Marine Hospital, Staten Island, N.Y., to meet new responsibilities of Service.

1891 Hygienic Laboratory moves from Staten Island to Service headquarters, Washington, D.C.

1912 Name of Public Health & Marine Hospital Service changed to Public Health Service.

1930 Hygienic Laboratory becomes National Institute of Health.

1937 Congress authorizes National Cancer Institute.

1938 National Institute of Health moves to land donated by Mr. and Mrs. Luke I. Wilson at Bethesda, Md.

1947 Division of Research Grants established to process NIH grants and fellowships to non-Federal institutions and scientists.

1948 National Heart Institute authorized; other laboratories regrouped to form Microbiological Institute, Experimental Biology & Medicine Institute, and National Institute of Dental Research. NIH becomes National *Institutes* of Health.

1949 Mental hygiene program of Public Health Service transferred to NIH and expanded to become National Institute of Mental Health.

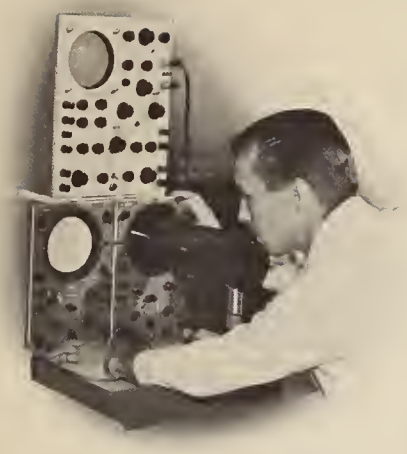
1950 National Institute of Neurological Diseases & Blindness and National Institute of Arthritis & Metabolic Diseases established, the latter absorbing Experimental Biology & Medicine Institute.

1953 Public Health Service becomes a constituent of newly created Department of Health, Education, & Welfare; Clinical Center opens.

1955 Three Divisions formed—Biologics Standards, Research Services, and Business Operations. National Microbiological Institute becomes National Institute of Allergy & Infectious Diseases.

1958 Division of General Medical Sciences created.

1959 Office of Administrative Management formed, consolidating the Division of Business Operations and other managerial responsibilities.



Growth and Progress

AT THE beginning of this century, the average newborn child in the United States could be expected to live only 47 years. Today the average life span is 70 years. One of the reasons for this gain has been the progress of medical science, particularly against the infectious diseases.

Among agencies contributing to this progress has been the Public Health Service. Since its creation by Congress in 1798, this organization—first named the Marine Hospital Service—has shouldered a steadily increasing responsibility. Today its various services and facilities, such as those of the National Institutes of Health, form an important part of the Nation's public health resources.

The Service has conducted medical research since 1887, when a laboratory of bacteriology was established on Staten Island, N.Y. This was in response to the urgent need to guard against epidemics that might arise from persons entering the country. Dr. Joseph J. Kinyoun, director of the new laboratory, was the first to detect the cholera organism among immigrants to America.

The leading causes of death at that time were infectious diseases—pneumonia and influenza, tuberculosis, intestinal disorders. But those were also the days of Pasteur, Koch, and Ehrlich. They were days of discoveries that offered not only effective health weapons, such as diphtheria antitoxin, but also basic principles that launched an era of great progress in medical science.

The Public Health Service's laboratories, now centered largely in the National Institutes of Health at Bethesda, Md., have made many research discoveries of importance in the prevention and treatment of diseases and other disabling conditions. Illustrative examples are: recognition that pellagra results from a dietary deficiency; development of a vaccine and serum against Rocky Mountain spotted fever; demonstration that one type of cancer (choriocarcinoma) can be suppressed by chemotherapy; development of a technique for detecting abnormal openings between the left and right chambers of the heart; and the discovery of several diseases—ariboflavinosis, Louisiana pneumonitis, rickettsialpox.

Research in metabolism, though often applied to a specific health problem, is gradually building toward an overall view of body chemistry. For example, much progress has been made in mapping the numerous steps by which sugar in the body is converted to a usable form and finally burned to yield energy. Then, the means by which energy is harnessed are also being investigated. Such mechanisms involve vitamins, minerals, enzymes, and other substances. Intricate indeed is the jigsaw puzzle of metabolism, normal and abnormal; and a complete solution, certainly far in the future, would leave few mysteries of disease.

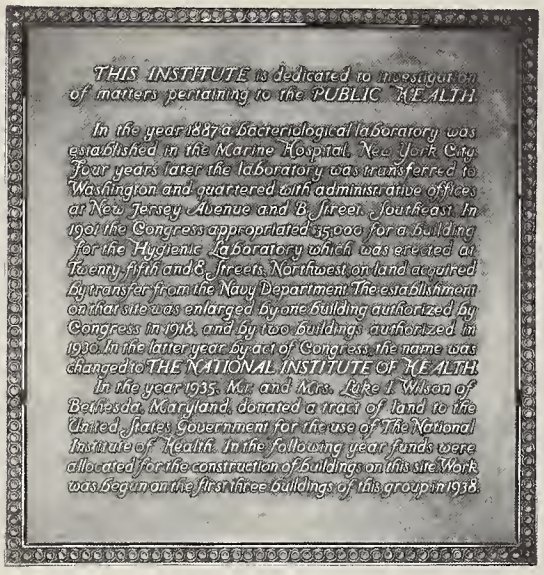
Biophysics, the science of matter and motion as related to life, is another expanding discipline that serves many fields. Again, new equipment and techniques have played a major part. For example, the electron microscope, about 100 times as powerful as earlier instruments, has extended the visualization of tissues to their smallest units, the molecules themselves. The ultracentrifuge, a high-speed whirling device, separates the particles composing cells. Other instruments that have opened new approaches are generators of subatomic particles in the multimillion-volt range, and brain-scanning equipment which permits detection and precise location of brain tumors without opening the skull.

Before World War II, major trends were apparent in the Nation's health. Sanitation, better nutrition, improved medical treatment had all contributed to longer life; and more people were subject to the ills

of an aging popuation—the so-called chronic diseases. Their control would require new knowledge, new basic principles that only research could provide.

Accordingly, Congress authorized in 1937 the National Cancer Institute, dedicated to research against the disease that had risen from eighth to second place as a cause of death in this country. By 1949, the scope of investigation had been extended to include six additional research Institutes at Bethesda, some incorporating older laboratories, each to work in a problem area such as heart diseases or mental illness. The Division of General Medical Sciences was created in 1958 for general support of research in the biological and medical sciences, administration of research training and fellowship programs, and support and encouragement of research into the phenomena and problems of aging.

The Clinical Center, a 500-bed facility for clinical-laboratory research, enables each of the Institutes to bring together the many highly specialized laboratory sciences and clinical disciplines for the study of disease in man.


THIS INSTITUTE is dedicated to investigation of matters pertaining to the PUBLIC HEALTH

In the year 1887 a bacteriological laboratory was established in the Marine Hospital, New York City. Four years later the laboratory was transferred to Washington and quartered with administrative offices at New Jersey Avenue and B Street, Southeast. In 1901 the Congress appropriated $35,000 for a building for the Hygienic Laboratory which was erected at Twenty-fifth and E Streets, Northwest, on land acquired by transfer from the Navy Department. The establishment on that site was enlarged by one building authorized by Congress in 1918, and by two buildings authorized in 1930. In the latter year by act of Congress, the name was changed to THE NATIONAL INSTITUTE OF HEALTH.

In the year 1935, Mr. and Mrs. Luke I. Wilson of Bethesda, Maryland, donated a tract of land to the United States Government for the use of The National Institute of Health. In the following year funds were allocated for the construction of buildings on this site. Work was begun on the first three buildings of this group in 1938.

Historical Note

Commemorating the dedication of the National Institutes of Health administration building is the following historical statement, inscribed on a bronze plaque just inside the main entrance:

This institute is dedicated to investigation of matters pertaining to the public health.

In the year 1887 a bacteriological laboratory was established in the Marine Hospital, New York City. Four years later the laboratory was transferred to Washington and quartered with administrative offices at New Jersey Avenue and B Street SE. In 1901 the Congress appropriated $35,000 for a building for the Hygienic Laboratory, which was erected at 25th and E Streets NW., on land acquired by transfer from the Navy Department. The establishment on that site was enlarged by one building authorized by Congress in 1918, and by two buildings authorized in 1930. In the latter year, by act of Congress, the name was changed to "The National Institute of Health." [1]

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[1] In 1948 the name National Institutes of Health was made official by another act of Congress.

National Institutes of Health Today

SINCE World War II, the National Institutes of Health has been part of a national trend toward more emphasis on research and development in all fields.

Throughout this period of growth, research in the life sciences has maintained pace and continues to account for about 4 percent of the total.

A breakdown of the sources of support of medical and related research shows—as is true with all research and development in the United States—that Federal programs have contributed the major share in supporting this expansion. Today, six Federal agencies conduct or support medical research or fundamental research related to medicine. They are: Department of Health, Education, and Welfare; Department of Defense; Atomic Energy Commission; Veterans Administration; National Science Foundation; and Department of Agriculture.

The Department of Health, Education, and Welfare is responsible for about four-fifths of the Federal expenditure for medical research. About 85 percent of the Department's appropriations for medical research are invested in Public Health Service programs conducted and administered by the National Institutes of Health.

A predominant part (in fiscal year 1960 about 80 percent) of the public funds appropriated for NIH is in turn awarded to non-Federal institutions such as medical schools and colleges, universities, hospitals and scientific institutions for the support of research studies, research training, and the construction and equipping of new and modernized research facilities. This is often referred to as the extramural program.

Research project grants constitute the largest part of the extramural program. The purpose of these grants is to stimulate research in medical and allied fields by making available funds for such research and by actively encouraging scientific investigation of specific problems on which scientists agree that urgently needed knowledge is lacking. Since its inception in 1946, the research grants program has operated under a basic tenet that the integrity and independence of the research worker and his freedom from control, direction, regimentation, and outside interference are paramount. Initially, it was possible to provide support to investigators on a year-to-year basis only. Through the years, however, the promised period of support given to investigators starting a new project has increased gradually to an average of more than 3 years. Thus, the recipient of a new grant today has greater assurance of stability in planning a program of research. In Fiscal Year 1959, a total of 9,166 of these grants were awarded to scientists in more than 750 non-Federal institutions.

Although the research projects supported by NIH-administered grants provide secondary training benefits in a research atmosphere, the support of research training and related activities is a distinct and separate part of the extramural program. These efforts do not constitute the primary source of funds for the training of doctors, dentists, nurses, and medical scientists, but rather serve to supplement the sums provided by State and local governments, by private philanthropy, and by the families and friends of the students themselves.

There are two basic types of support for the training of research personnel: (1) fellowships and (2) training grants and traineeships.

Fellowships provide personal support, and in some instances provide for certain additional costs, for persons engaged in research training at one level or another.

Training grants are mainly for the purpose of assisting institutions to establish, expand, or improve their research and special training programs and to increase the number and improve the caliber of trained personnel in fields of major interest to the various Institutes.

Traineeships provide individual stipends to qualified investigators and others in order that they may undergo training in specialized areas of medical and related research and technology, including the fields of public health and nursing.

A third major activity of the extramural program provides grants on a matching basis to public and private nonprofit institutions to assist in the construction of additional facilities for the conduct of research in the sciences relating to health. In the 3 years following passage of the Health Research Facilities Act of 1956, hundreds of institutions in almost every State of the Union have benefited from this legislation.

To assure that the direction and method of operation of the grants and awards programs are in the national interest, NIH relies on advisory and consultative groups to the Public Health Service. These groups, consisting of some of the Nation's leading scientists and informed, public-spirited citizens, provide study and advice which is an inherent part of the philosophy that NIH grants and awards programs are of and for the scientific community and in behalf of the people of the United States.

For example, the Study Sections—which numbered 34 in 1959—are composed of specialists who represent the disciplines that comprise modern medical science. These Sections, composed of non-Federal specialists, screen each grant application to ascertain the qualifications and competence of the investigators, adequacy of the research findings, significance of the proposed study, and the relative importance of particular areas of research.

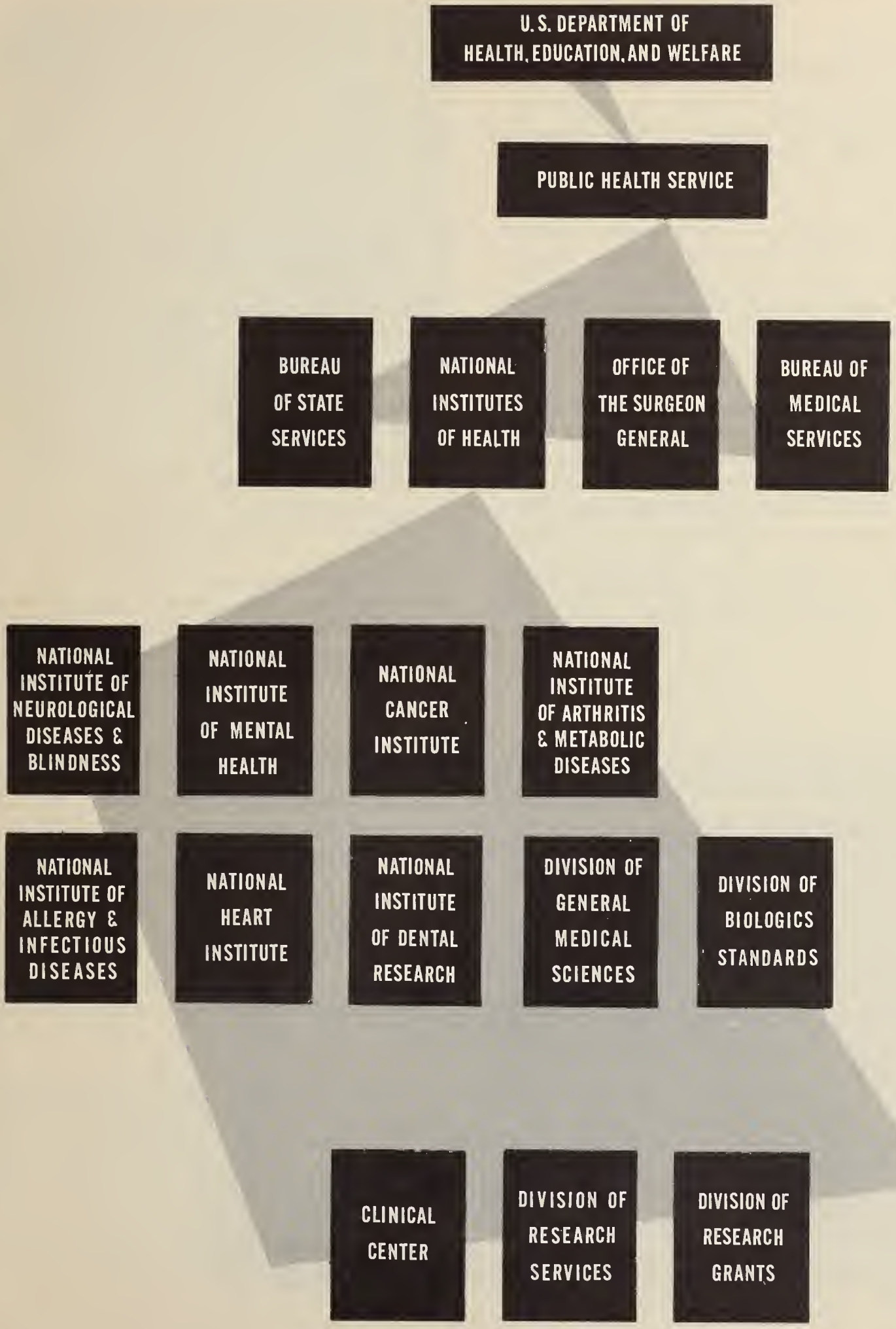
Each Study Section reaches its decisions objectively and submits its professional recommendations to a second group of advisory bodies—the National Advisory Councils. Statutory rather than administratively established, the Councils are composed of leading lay citizens as well as non-Federal scientists. There are nine Advisory Councils: one for each of the seven Institutes at NIH, the Health Research Facilities Advisory Council, and the National Advisory Health Council, which serves both for the Division of General Medical Sciences and the broad aspects of public health research. The Surgeon General of the Public Health Service may not approve a grant application that has not been recommended by an Advisory Council.

A third type of advisory body was created at NIH in 1957. These groups, called Boards of Scientific Counselors and composed of six non-Federal scientists, advise each of the Institutes and the Division of Biologics Standards on the scientific activities conducted directly in the clinical and laboratory facilities of NIH.

At Bethesda and in its field facilities, the NIH staff numbers more than 7,000 full-time workers, including about 1,000 with doctoral degrees. More than half of these doctors are M.D.'s, and most of the remainder are Ph. D.'s. In addition, nearly 10 percent of the physicians at NIH also have a Ph. D. or other doctorate. The scientific staff also includes dentists, veterinarians, and doctors in other sciences. In its own laboratories, the National Institutes of Health conducts more than 1,400 research projects. They cover many areas that can be specifically identified with the diseases for which the Institutes were named, but a substantial number of studies deal with fundamental body processes essential to basic understanding of disease and health.

Top program direction and coordination are provided by the Director of NIH, his professional staff associates for guidance of the intramural and extramural programs, and staff aides for administration, program planning, and research information. The Office of the Director works with the Institute Directors, Scientific Directors, and others in the Institutes and Divisions to coordinate and evaluate the research and support programs.

In summary, then, the National Institutes of Health serves primarily as a focal point for the national support of health research and secondarily as an institution which, in itself, conducts a wide variety of laboratory and clinical research aimed at discovering new knowledge about the prevention, diagnosis, and treatment of disease and disability.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NATIONAL INSTITUTE OF MENTAL HEALTH
NATIONAL CANCER INSTITUTE
NATIONAL INSTITUTE OF ARTHRITIS & METABOLIC DISEASES
NATIONAL INSTITUTE OF ALLERGY & INFECTIOUS DISEASES
NATIONAL HEART INSTITUTE
NATIONAL INSTITUTE OF DENTAL RESEARCH
DIVISION OF GENERAL MEDICAL SCIENCES
DIVISION OF BIOLOGICS STANDARDS
CLINICAL CENTER
DIVISION OF RESEARCH SERVICES
DIVISION OF RESEARCH GRANTS

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National Institute of Allergy and Infectious Diseases

INFECTIOUS disease research is the oldest activity of the National Institutes of Health. In recent years the science of microbiology has shiften in emphasis and approach to meet new problems of allergy and infectious disease and to use newly acquired knowledge.

Although striking gains have been made against the bacterial diseases, serious problems are unsolved. The widespread allergic diseases, for example, have received little attention, and their extent is only beginning to be appreciated. Our knowledge of the viral diseases is fragmentary. Some diseases of the upper respiratory tract are so poorly understood that we cannot assemble accurate figures on their prevalence.

Through biochemical and biophysical studies, scientists of the National Institute of Allergy and Infectious Diseases seek an understanding of the structure and functioning of viruses, the smallest "living" substances; and the role of proteins, largest of the "nonliving" molecules. Knowledge gained is important for all the biological sciences.

In this work, scientists have been aided by new and improved techniques. Prominent is the culturing of viruses within tissues living in test tubes. This truly revolutionary tool has initiated a new era in virus research. It permits propagation of viruses without the use of animals.

Aim of long-term nursery study is isolation and characterization of viruses involved in respiratory diseases.

The significance of this is illustrated by research on the common respiratory illnesses. This problem has resisted solution, in part because scientists could not isolate and maintain the causative agents. Tissue culture overcame this obstacle, and Institute workers can now develop experimental vaccines against certain of these viruses.

Within the past decade, scientists of these and other laboratories discovered nearly 100 viruses in man, though not all are known to cause human disease.

Some representative diseases studied by the Institute are influenza, poliomyelitis, hepatitis, rheumatic fever, tuberculosis, encephalitis, and brucellosis. Problems range from the clinical evaluation of vaccines to the investigation of allergic factors and host-parasite relationships. Diseases of public health importance in the Western States are studied at the Rocky Mountain Laboratory in Hamilton, Mont.

The parasitic diseases are also under study by the Institute. While many of these occur outside the country, a number are prevalent in the United States—amebic dysentery, trichinosis, and toxoplasmosis, to name a few. Many parasitic diseases are important to world health. Malaria, for example, disables or kills millions of people each year. The Institute is conducting research to augment global malaria eradication by world health agencies. Better drugs have been developed for treatment. In large part, their evaluation in humans was carried out by Institute scientists.

A major project of the Institute is an investigation of the precise nutritional requirements of various types of cells in tissue culture. This work relates not only to virus research but to fundamental growth problems, such as cancer. It enables scientists to explore the interaction between host tissues and invading virus, and may throw light on the basic life processes in normal and malignant cells.

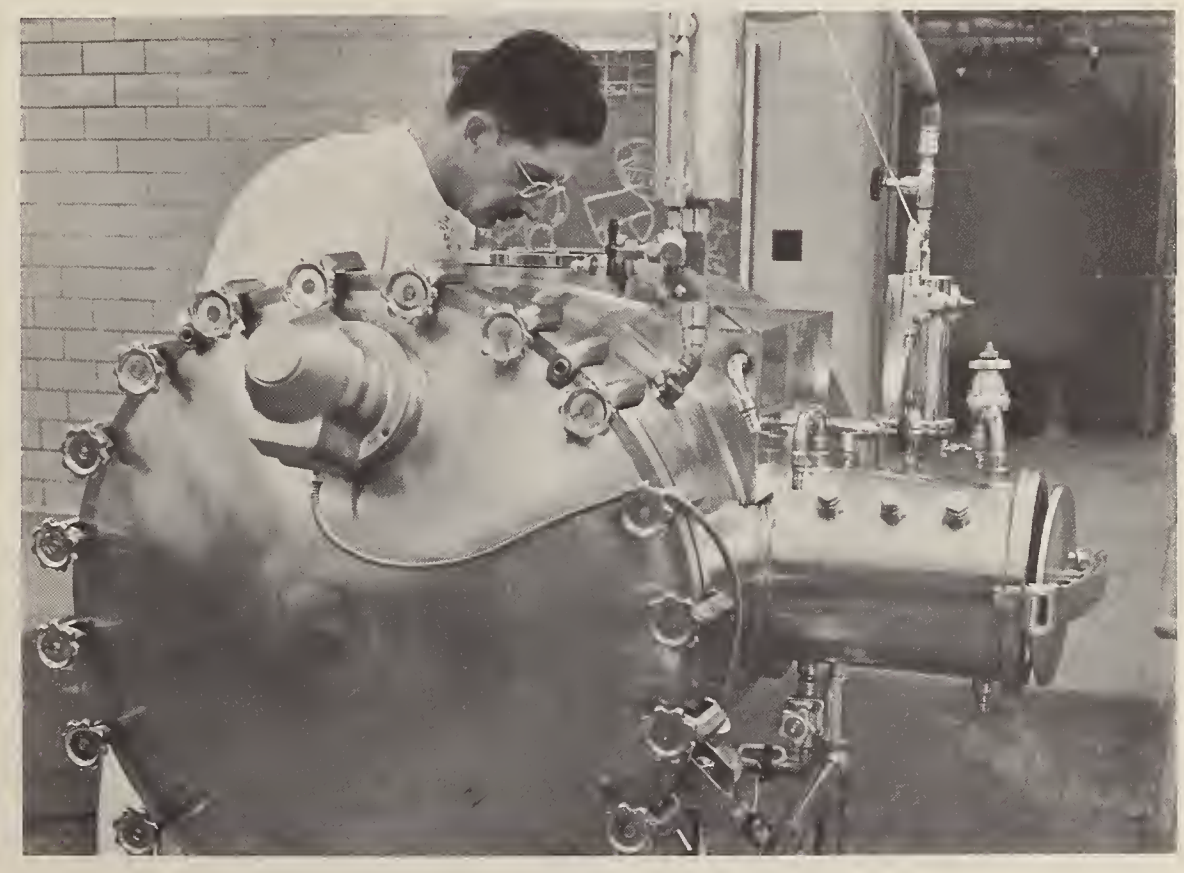
Diagnosis of certain diseases is simplified by a rapid procedure, the bentonite flocculation test.

To augment research, the Institute awards grants in allergy and microbiology at universities, medical schools, and other non-Federal institutions. Competitive fellowships in these fields help to develop the Nation's research manpower.

The Institute's clinical research program has greatly extended the attack on major infections and parasitic diseases. The latter in particular remain to be adequately explored. Schistosomiasis and filariasis, for example, cannot yet be treated definitively. Clinical investigation of these widespread diseases emphasizes experimental therapy and better methods of diagnosis.

Progress against the infectious diseases in recent years has been rapid and gains are continuing. In some respects the most challenging advance has been the growing awareness of the relation of infectious diseases to chronic disorders. Some of the latter originate in infections that occur years before. Future progress against these chronic ailments depends in part on better understanding and more effective control of infections earlier in life.

Much of the work supported by the Allergy and Infectious Diseases Institute is related particularly to children—respiratory diseases, whooping cough, poliomyelitis, cystic fibrosis, toxoplasmosis, and rheumatic fever. Children are still the principal victims of communicable diseases. All too frequently, these afflictions result in chronic illness or invalidism.



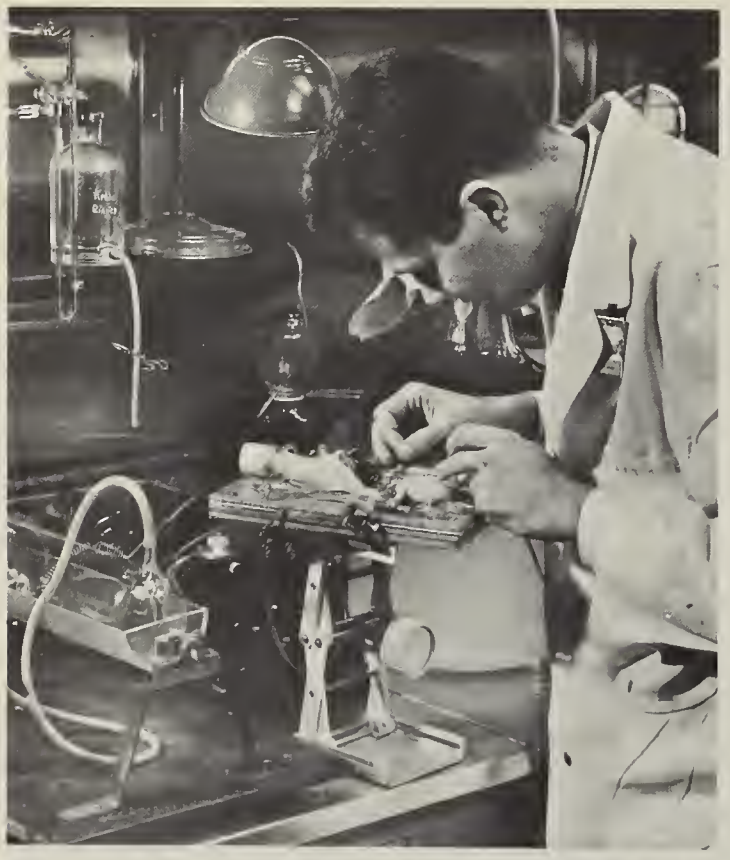
This stainless steel pressurized tank provides a sterile environment for rearing germfree animals.

National Institute of Arthritis and Metabolic Diseases

ARTHRITIS ranks as the world's leading crippler. No other disease known attacks as many people and leaves them permanently disabled. In rheumatoid arthritis, the most damaging form of arthritis, the joints of the body become painful and stiff, and body movements are no longer the effortless and comfortable actions they once were. Finding out what causes this breakdown and what can be done to prevent or repair the damage is one of the major research aims of the National Institute of Arthritis and Metabolic Diseases.

Another major aim of the Institute is the continuing search for fundamental knowledge of basic life or metabolic processes. Fuller understanding of these underlying body mechanisms is a primary route leading ultimately to the conquest of specific diseases.

The Institute is made up of some of the oldest laboratories of the Public Health Service. It incorporates the former Experimental Biology and Medicine Institute, containing laboratories of biochemistry, nutrition, pathology, pharmacology, physiology, chemistry and physical biology.



Insulin metabolism in the intact liver is studied with assistance of an organ perfusion system.

The Institute's laboratories have contributed significantly to the Public Health Service's record of progress. Achievements include the determination of the cause, prevention, and treatment of pellagra; the discovery that oral administration of ordinary table salt and baking soda dissolved in water holds promise as a mass emergency treatment for shock; and the development of synthetic drugs like phenazocine that make the United States potentially independent of foreign sources of opium.

The establishment of the Institute in 1950 followed a surge of interest in the rheumatic and metabolic diseases, stimulated by the momentous discovery that some arthritic patients are benefited by hormones—cortisone or ACTH. This indicated that hormonal balance and metabolism may be important factors in the cause and development of rheumatic disease. Following the discovery of cortisone's antirheumatic properties, other hormones such as hydrocortisone, prednisone and dexamethasone were synthesized by the pharmaceutical industry and clinically tested at the Institute. These synthetic steriods are chemical modifications of the original cortisone molecule, and were designed to provide increased potency with fewer undesirable side effects. They have led to the rehabilitation of thousands and have greatly broadened arthritis research. As newer antirheumatic drugs are developed, the most promising ones are tested by Institute clinicians.

By means of radioactive forms of cortisone and other hormones, progress is being made in clinical tests to determine how hormones are utilized in the body. This is part of the search for similar antirheumatic substances and for a better understanding of the causes of rheumatic disease.

A major effort to obtain basic understanding of rheumatoid arthritis is directed toward determining the precise nature of a substance known as the rheu-

matoid factor, found in the blood of patients with rheumatoid arthritis. The presence of this factor helps confirm the diagnosis of the disease. Its detection has been made easier by the development in NIH laboratories of a simple blood test which can be performed in a doctor's office in less than 20 minutes.

Research emphasis has also been placed on studies to determine whether there may be an immunologic basis for rheumatoid arthritis. Some scientific evidence points to the possibility that the disease is one of hypersensitivity, that it results from an immune reaction to either a foreign substance or to a native one that has become altered within the body. Intensive immunological studies are being pursued by many Institute grantees to evaluate this possibility.

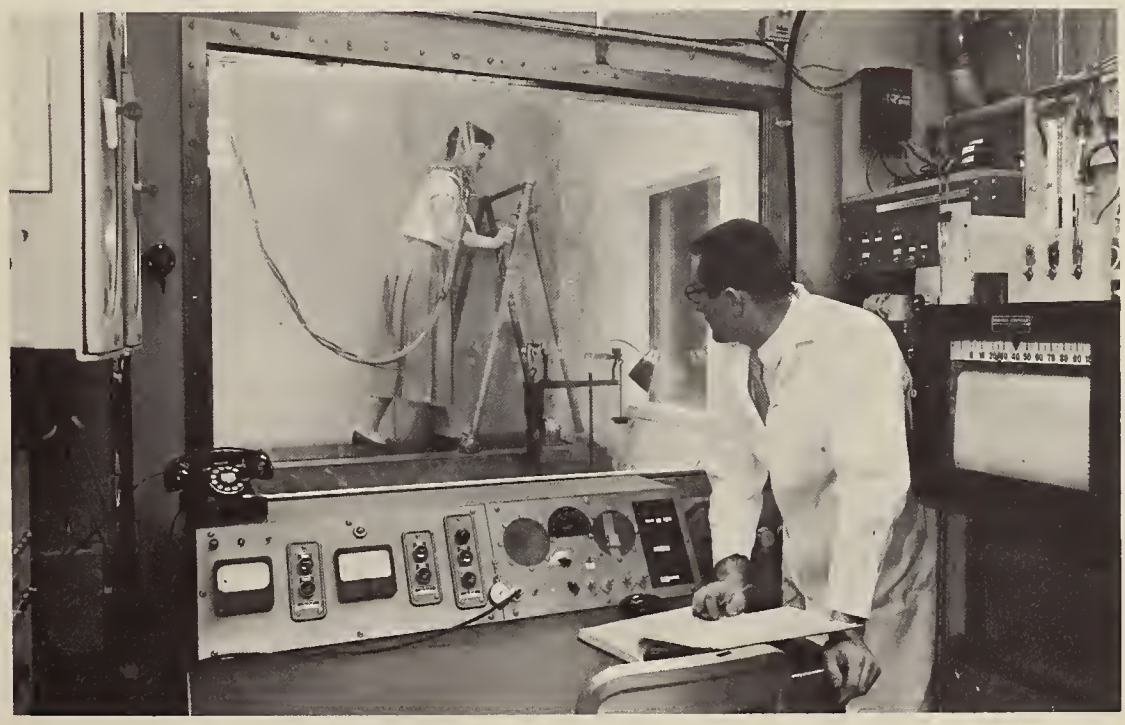
Although the Institute has made notable contributions to the knowledge of specific diseases, its laboratories are best known for their fundamental research. For example, the laboratory studying the chemistry of sugars has been a leader in this field for a quarter of a century. Physical biologists of the Institute have shared in the development of electron microscopy as a tool for learning how viruses multiply and for exploring the basic structures of cells.

In other laboratory studies, endocrinologists are methodically explaining the relation of the glands to the nervous system, especially as regards the metabolic diseases. Biophysicists are exploring the basic mechanics of respiration, muscle contraction, and other functions, largely under special conditions such as high altitude. Studies in pathology are conducted both as an independent approach and cooperatively with other NIH scientists.

In the Clinical Center, the Institute has developed a program that closely integrates the work of laboratory scientists and clinical investigators. This program has resulted in the discovery of the exact biochemical basis for two of the metabolic diseases, galactosemia and alcaptonuria. Laboratory and clinical studies of galactosemia resulted in a lifesaving diagnostic test, and studies of alcaptonuria are providing new leads to the causes of arthritis. Studies involving patients with rheumatoid arthritis, gout, liver diseases, diabetes, and various other metabolic disorders are under way.

An example of the projects made possible by the facilities of the Center is research on energy metabolism, utilizing a respiratory chamber. This is a specially equipped room, designed for determinting the total energy expenditure of patients tested. Nutrients and gases consumed are accurately measured, wastes are analyzed, and energy output is recorded. Such research is particularly important to the understanding of obesity.

The Institute also awards grants to aid research in non-Federal institutions, and fellowships and training grants to develop research talent to carry on studies in the causes, diagnosis, and treatment of the rheumatic and metabolic diseases.



In sealed metabolic chamber, patient exercises while technician records data in the control room.

National Cancer Institute

EACH year in the United States, nearly three-quarters of a million people are treated for cancer, and more than a half million of these cases are newly diagnosed. Approximately a quarter of a million cancer deaths occur annually. At prevailing rates, 16 out of every 100 people born are destined to die of this disease.

Cancer is a disease of cells. Once a cell has become malignant, the change appears to be irreversible and the cell reproduces in its new form. Cancers of various organs or tissues are apparently due to different causes and therefore present different problems in cancer research and control.

The National Cancer Institute is attacking these problems through an extensive research program into the causes, detection and diagnosis, and treatment of cancer. Many scientific specialties are represented in the broad research programs of the Institute's staff. Growth processes, hormones, cell chemistry and mechanisms, cancer susceptibility and resistance tumor-host relationships, nutrition and tumor growth, cancer-inducing and cancer-destroying agents—these and many more aspects of the problem are studied in an effort to gain the necessary knowledge to conquer this disease.

In leukemia research, young Clinical Center patients are observed in the Pediatrics Unit.

Studies of human cancer are carried on in the Clinical Center, where the Institute is allotted a share of laboratory space and hospital beds for coordinated research and treatment.

Chemotherapy, or treatment by chemicals or drugs, is one of the promising areas of research to find new cures for cancer. Chemotherapy is becoming a valuable adjunct to surgery and radiation, the only curative treatments. However, no cures have been effected by the use of drugs alone. Research in chemotherapy has been greatly accelerated under a national cooperative program, co-sponsored by leading organizations and Government agencies, including the Cancer Institute. The pharmaceutical industry cooperates with this program in the screening of thousands of compounds in laboratories throughout the country, in the hope of finding effective anticancer drugs.

Much attention is also given to the effects of radiation on normal tissues and cancer. Therapeutic uses of radioactive substances, the development and evaluation of supervoltage radiation, and attempts to prevent or modify the undesirable side effects of radiation are important areas of investigation.

Hormones play a role in the development of cancer of certain tissues, such as those of the breast and reproductive organs. Moreover, changes in the hormonal balance of the body will retard some cancer for varying periods. These discoveries have greatly stimulated the study of hormones—endocrinology—as related to cancer growth.

Institute scientists are conducting intensive research on the role of viruses in cancer. Viruses are known to produce cancer in plants and animals, and there is a strong possibility that they may cause certain types of human cancer as well. If it can be proved that cancer in man is associated with viruses, it may be possible to develop an effective weapon against the disease—an anticancer vaccine.

The attack on leukemia has led to the establishment of a pediatrics unit in the Clinical Center to which leukemic children are admitted for "total" research on the cause and treatment of this disease. Increased

Tumor-damaging drugs are injected into eggs to measure toxicity by effect on chick embryos.

attention is being given to the role of environmental factors, such as radiation, in the cause of leukemia. In treatment, drugs such as cortisone, ACTH, 6-mercaptopurine, and methotrexate are useful in prolonging lives of many patients.

In a large proportion of cases, cancer gives no warning of its presence in internal organs until it has reached an advanced stage. Hence, the Institute conducts and supports many studies of diagnostic tests and procedures. Progress is being made on tests for cancer of specific sites as well as on a general test. A special area of Institute interest concerns large-scale field studies of the cytology test, which has proved particularly useful in detecting cancer of the uterus and is being applied to other body sites. X-ray techniques are continually being improved in an effort to detect cancer in an earlier stage.

Variations in the prevalence of some forms of cancer have been observed among persons living or working in different environments and among persons of different ethnic groups. The Institute conducts environmental and epidemiologic studies in an effort to determine why such variations occur and how this knowledge might be used to prevent cancer.

Better nursing care of the cancer patient is promoted through studies to determine needs, and through educational programs to increase nurses' skill in handling cancer problems in the hospital and community. Institute staff members conduct work conferences and university courses for nursing instructors, consultants, and supervisors. Consultation in both cancer nursing education and service is offered in schools of nursing, and to directors and consultants in community agencies.

An important segment of the Institute's attack on cancer is the large and diversified extramural program under which grants-in-aid are made to scientists in non-Federal institutions for research projects into the cause, prevention, and methods of diagnosis and treatment of the disease. These studies are constantly yielding new knowledge of cancer and have resulted in many improvements in its diagnosis and treatment.

Institute grants-in-aid also support extensive educational programs, both undergraduate and graduate, for physicians, dentists, nurses, and other personnel concerned with the diagnosis and treatment of cancer, and thus increase the skilled personnel available to serve the cancer patient. To help keep the public acquainted with facts about the disease, the Institute utilizes publications, films, exhibits, and other educational media.

In research on tissue metabolism, scientist separates isotopes with mass spectrometer.

National Institute of Mental Health

THE National Institute of Mental Health, authorized by Congress under the National Mental Health Act of 1946, is the focal point for the Federal Government's activities to gain knowledge about the causes of mental illness, to find more effective treatments, and to promote sound mental health. To meet these needs, the Institute conducts a broad, integrated program of research, training, community service, and public education.

During the past 12 years, mental illness has become a widely recognized public health problem. The Nation's public mental hospitals contain about 600,000 patients. The economic, social, and human losses occasioned by emotional disorders and mental illness are incalculably great. In addition, the lack of mental health underlies many of our most disturbing problems of family and community life.

Psychologist takes notes on mother and child interaction in simulated child-development study.

At present, the major needs in the field of mental health are for—

- More knowledge about the causes and treatment of the various psychoses and emotional disorders.
- More trained professional personnel to do research in mental health, to train others, and to provide services.
- More mental health facilities of the type now in existence, such as clinics.
- New types of service facilities to treat and rehabilitate, to prevent mental illness, and to build mental health throughout the community.
- Greater public understanding of the nature of mental illness, and increased public support.

The Institute awards grants to aid research in basic neurophysiology, neuroanatomy, and biochemistry as well as in clinical psychology and psychiatry. Among the subjects studied are the psychoses, psychosomatic disorders, evaluation of therapy, psychopharmacology, drug addiction, and psychological aspects of aging. In addition to supporting individual research projects, the Institute also provides long-term grants for investigators who are concentrating on key mental health areas.

In its own research program, the Institute emphasizes the interdisciplinary approach. The Institute laboratories emphasize physiological, pharmacological, and biochemical as well as psychologic and psychiatric investigations. Clinical studies are concentrated particularly on various types of schizophrenia and its biological aspects and on behavior disorders in children, psychosomatic disorders, and neuropharmacology.

The Institute also conducts studies to find new approaches to such growing problems as juvenile delinquency, mental retardation, and alcoholism. A long-term study of drug addiction is in progress at the Public Health Service Hospital in Lexington, Ky.

Many more people trained in the psychiatric specialties are acutely needed to staff the required facilities and to do research. To develop research po-

A research scientist tests changes in behavior patterns of a monkey that has suffered brain damage.

tential, the Institute awards fellowships to promising young scientists and provides career-investigator grants for long-term support of outstanding scientists who wish to devote a major part of their careers to the field of mental health.

To increase the number of trained mental health workers, the Institute awards grants that enable institutions throughout the country to expand their training of psychiatrists, clinical psychologists, psychiatric social workers, psychiatric nurses, and allied personnel, including research and other psychologists who can contribute to mental health work.

The Institute also provides basic science students with research training in the mental health disciplines, awards traineeships to students who wish to follow mental health careers, supports training seminars for the orientation of persons already in practice, and holds conferences to improve professional standards and education. Special career-teacher grants assist outstanding mental health educators. Most of the four-year medical schools receive Institute grants for the psychiatric orientation of physicians.

To aid in expanding the range of mental health facilities, the Institute assists States through technical consultation and services, providing funds for the establishment of mental hygiene clinics, preventive programs in the schools, and other activities. Mental health programs are now under way in all States and territories; more than 1,200 child guidance and adult clinics are in operation.

Staff members are frequently requested to give technical advice in such matters as civil defense and disaster relief, promotion of mental health programs in schools, preparation of educational materials, and orientation of allied workers including nurses, teachers, lawyers, and ministers.

The Institute meets requests for personnel skilled in hospital administration to survey and advise on State mental hospital systems. Under the newly established mental health project grants program, funds are available to support studies and demonstrations aimed at improved methods of treatment, care, and rehabilitation of the mentally ill. The Institute provides consultative services in connection with this program, assists in collecting data about the mentally ill, develops programs for rehabilitating patients, and serves as a clearinghouse for information on mental health developments throughout the country. Educational activities are conducted in cooperation with professional, governmental, and civic organizations.

National Heart Institute

DISEASES of the heart and blood vessels cause approximately half the deaths in the United States. The heavy impact of this problem is felt not only in loss of life, but also in disability, suffering, and extensive economic loss. Heart disease claims many of its victims prematurely, in their most productive years. About 10 million of our people have cardiovascular afflictions, and there are relatively few effective therapies. New knowledge must come from research. To help meet this serious national problem, Congress in 1948 established the National Heart Institute.

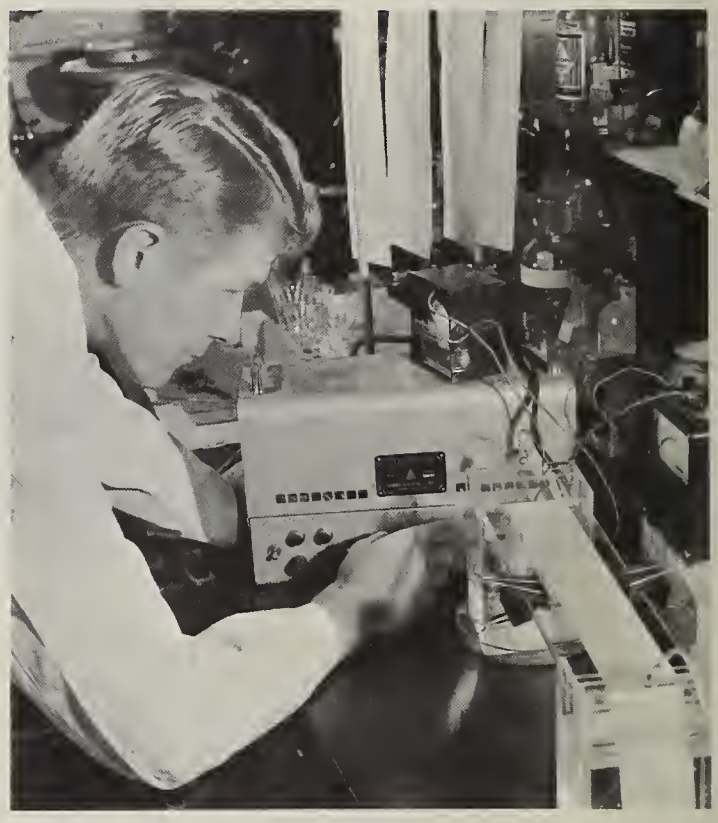
The research program of the Institute develops knowledge pertinent to an understanding of the structure, function, and abnormalities of the cardiovascular system. Understanding fundamental processes of a disease is the surest road to better means of countering it.

The Institute scientists attack a wide range of problems and apply a variety of disciplines. One area of activity is research in the chemistry of natural products, concerned with naturally occurring compounds of physiological importance. For example, a compound that depresses blood pressure in experimental tests has been isolated from the rhododendron plant and is now under laboratory and clinical study.

Investigators in cellular physiology and metabolism are attempting to translate to a cellular or organ level the advances made in the general field of enzyme chemistry and biophysics. The means by which cells utilize the chemical energy of foodstuffs for such processes as muscular contraction are studied, as are the factors implicated in the development of atherosclerosis, the major form of hardening of the arteries.

Pharmacological research is aimed at the development of better drugs for the treatment of diseases of the heart and blood vessels. For example, studies of the pathways by which drugs are broken down in the body permit the design of drugs for specific purposes, such as an anesthetic that loses effect as soon as administration is stopped—a highly desirable feature in surgery on elderly and cardiac patients.

The study of medical physiology is concerned with such matters as the mechanisms by which blood vessel size, and thus blood pressure, are regulated, and with factors related to the distribution of important salts in the body. In studies of kidney function, a recent accomplishment is the demonstration that the failure of salt excretion by the kidney, which leads to edema (dropsy) in heart failure, involves an increase in the activity of the adrenal glands.



Separation of enzymes by filter paper electrophoresis is used in studies of arteriosclerosis.

Technical developments are providing a number of useful devices for the detection, diagnosis, and study of disease by physical means, and for the facilitation of laboratory and clinical research.

Studies are being conducted on the physiological, biochemical, and psychological changes that take place in aging people. One technique for evaluating the effects of aging on blood vessel walls is based upon the capacity of these vessels to transmit an externally applied impulse.

Institute research in surgery seeks to improve surgical procedures for the correction and alleviation of disorders of the heart and blood vessels. Great strides have recently been made in this field, and many potentialities remain.

In general medicine and experimental therapeutics, new techniques, instruments, and drugs, some of them developed in laboratories of the Institute, are being evaluated, with emphasis on hypertension (high blood pressure).

Laboratory investigations are the foundation of heart research and demand the greatest part of the work. Clinical application, however, is the topmost stone of the pyramid. The facilities of the Clinical Center provide the opportunity to carry significant work to actual clinical trial, with minimum delay. The Heart Institute also conducts or participates in research at various hospitals.

In addition to its laboratory and clinical research at Bethesda, the Institute is conducting a long-term community study at Framingham, Mass. This may provide definite information as to what characteristics are present in people who develop heart disease. The project involves a detailed physical reexamination every 2 years of over 5,000 adults who were between the ages of 29 and 62 when first examined.

Other important parts of the Institute's attack on heart disease are the extensive program of grants for research in universities and hospitals, and training programs of three types—research fellowships, clinical traineeships, and teaching grants to medical schools. Other functions include biometrics research and public and professional information activities. Aid to the States in developing community heart disease programs is given in cooperation with the Bureau of State Services of the Public Health Service. The National Heart Institute spearheads the total Public Health Service attack against heart disease, actively cooperating with other agencies and organizations in an accelerating drive.

The past few years have witnessed much progress. Advances in basic knowledge, in surgery, and in the development of drugs and techniques have strengthened hopes that the Nation's leading killer is not invincible. Yet the larger portion of the task remains. The underlying factors responsible for rheumatic, hypertensive, and arteriosclerotic heart disease—which account for 90 percent of all heart deaths—are still unknown. The search for the causes of these diseases and for means of controlling them, an expanding nationwide effort, may prevent much untimely death and disability in the not-too-distant future.

This counter-current distribution device isolates biological materials used in drug action studies.

National Institute of Dental Research

Crystallites and supporting organic framework of teeth are observed under electron microscope.

THE National Dental Research Act of 1948 authorized the establishment of the National Institute of Dental Research. In the early years of the Institute's intramural program, major research activity derived from the discovery by NIH workers in 1938 that the element fluorine in the drinking water provides substantial protection against dental caries. Determination of the proper concentration of fluorine and the ruling out of any harmful effects were further achievements. After more than a decade of study at Grand Rapids, Mich., beneficial results are not only continuing to be evidenced in children born subsequent to fluoridation, to the extent of 60–65 percent reduction in dental caries, but also in children whose teeth had already calcified before the beginning of fluoridation. Although dental caries is still a major health problem, each passing year sees progressive benefits to communities with fluoridated drinking water.

It is only within recent years that dentistry has come to realize an ever-increasing scope of responsibility and the wide horizons yet to be explored.

Although the National Institute of Dental Research accepts major responsibility for resolving the still-existing problems of dental caries and periodontal disease, particularly as related to treatment, control and eventual elimination, a broader concept of objectives is recognized in order to obtain a more basic knowledge of oral biological systems and their interrelationship in the body as a whole. Consequently, the goals of laboratory and clinical research are not necessarily oriented toward a previously defined practical dental application but rather to the pursuit of fundamental information that might ultimately contribute to major breakthroughs in the eradication of oral diseases. Another integral part of the Institute's research effort is the active support of projects and the encouragement and development of outstanding scientific personnel through the extramural grants program.

The study of factors that affect oral health is complex, and must, of necessity, embrace many scientific disciplines related to biology. Scientists at the National Institute of Dental Research are engaged in studies in oral bacteriology, pathology, biochemistry, epidemiology, genetics, and biophysics. Using the electron and X-ray microscopes as research tools, Institute scientists are studying enamel and dentin to learn more about the submicroscopic structure and physical and chemical properties of the teeth. Correlated with these studies are observations on the manner in which chemical agents such as fluorides, may alter the structure and properties of growing and mature enamel, and thereby contribute a resistance to dental decay.

In other projects, the study of nutrition in relation to dental caries has made significant progress. For

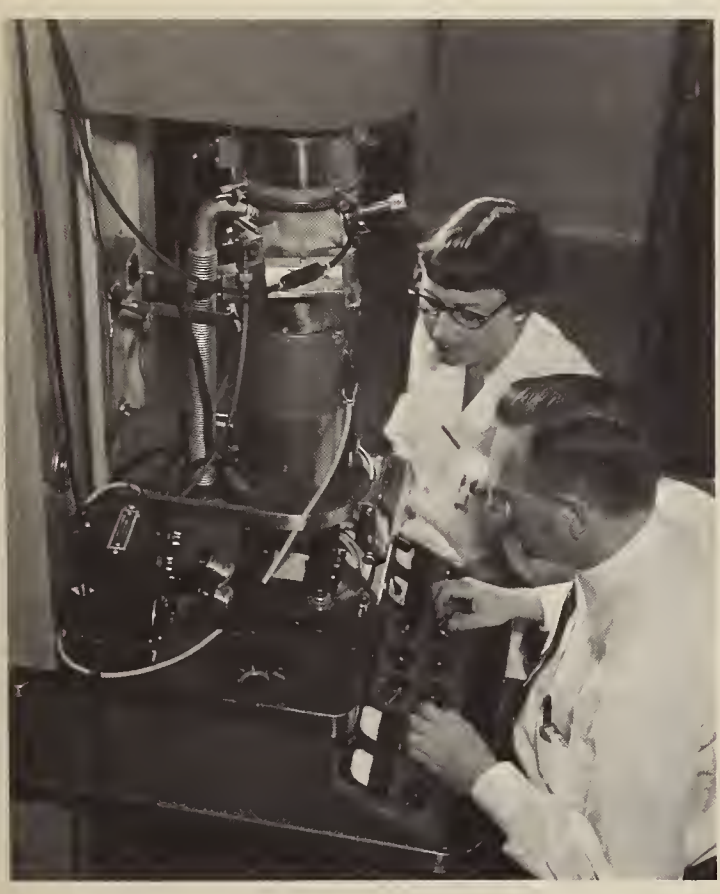
example, many foods when subjected to high temperature during commercial preparation have been shown to increase tooth decay in experimental animals. Consequently, the amino acid lysine as well as certain minerals such as tin and sodium acid phosphate may contribute significantly to protection against dental decay. Also under study are the many types of microorganisms associated with oral disease, and the use of antibiotics and other therapeutic agents.

In the field of epidemiology and biometry, emphasis is placed on the descriptive and determinative epidemiology of oral disease. It is significant that a study of dental caries by this approach developed the fluoride-caries relationship and established the safety and feasibility of fluoridation of domestic water supplies. The National Institute of Dental Research in cooperation with other institutions and Federal agencies is engaged in epidemiological studies of oral diseases in many areas of the United States, and in India and other countries.

The Institute has major responsibility for encouraging the clinical application of basic laboratory findings as they relate to cause, diagnosis, treatment, and prevention of oral disease.

Through the coordination of clinical and basic research in the study of periodontal disease, dental caries, tissue healing, dental anesthesia, and other subjects, the dental profession, and indirectly the Nation's population, will receive ever-increasing benefit.

The research grants program of the Institute continues to contribute significantly to the knowledge of underlying factors in oral health and disease. Research activities in more than 90 percent of the Nation's dental schools, and in many hospitals, local health departments, and other institutions, receive financial support from the Public Health Service. Of additional importance to the future of dental research in the United States is the recent establishment of graduate research training programs in many dental schools. The programs are specifically designed to train graduate students in the basic and clinical sciences related to the different specialties of dentistry, and thereby maintain a continued supply of qualified teachers and researchers. Such training programs, coupled with an increased number of fellowship awards and individual research project grants, represent a decisive forward step in the development of dental research.



Among the many techniques used in gaining broader understanding of oral disease is direct view microscopy.

A biochemist analyzes the effect of a controlled diet in studies of the composition of the teeth.

National Institute of Neurological Diseases and Blindness

THE marvel and the mystery of the brain and central nervous system in health and disease stimulate research at the National Institute of Neurological Diseases and Blindness. The brain controls all physical and mental action. While it makes up only 2 percent of the body weight, the brain requires one-sixth of the heart output and consumes nearly one-fifth of the oxygen used by the body.

Lack of oxygen for the brain cells is a well-known cause of rapid and permanent brain damage. Yet further discoveries continue on the causes and results of oxygen lack. In an Institute monkey colony in Puerto Rico, when oxygen is withheld at birth, baby monkeys show symptoms resembling cerebral palsy.

Every discovery about the brain offers a possible clue toward conquest of the 200-odd neurological ailments in which the Institute faces research problems. Improvements of the technique of artificial low body temperature called hypothermia make neurosurgery of the brain safer, and improve the medical care of brain injury and an increasing number of ailments.

An unprecedented attempt to find the causes of cerebral palsy, mental retardation, blindness, and kindred defects in children was launched by the Institute in 1959. Some 40,000 women throughout the country will be studied from early pregnancy through delivery. Their infants will be observed intensively in their critical early hours, and followed regularly until 6 years of age.

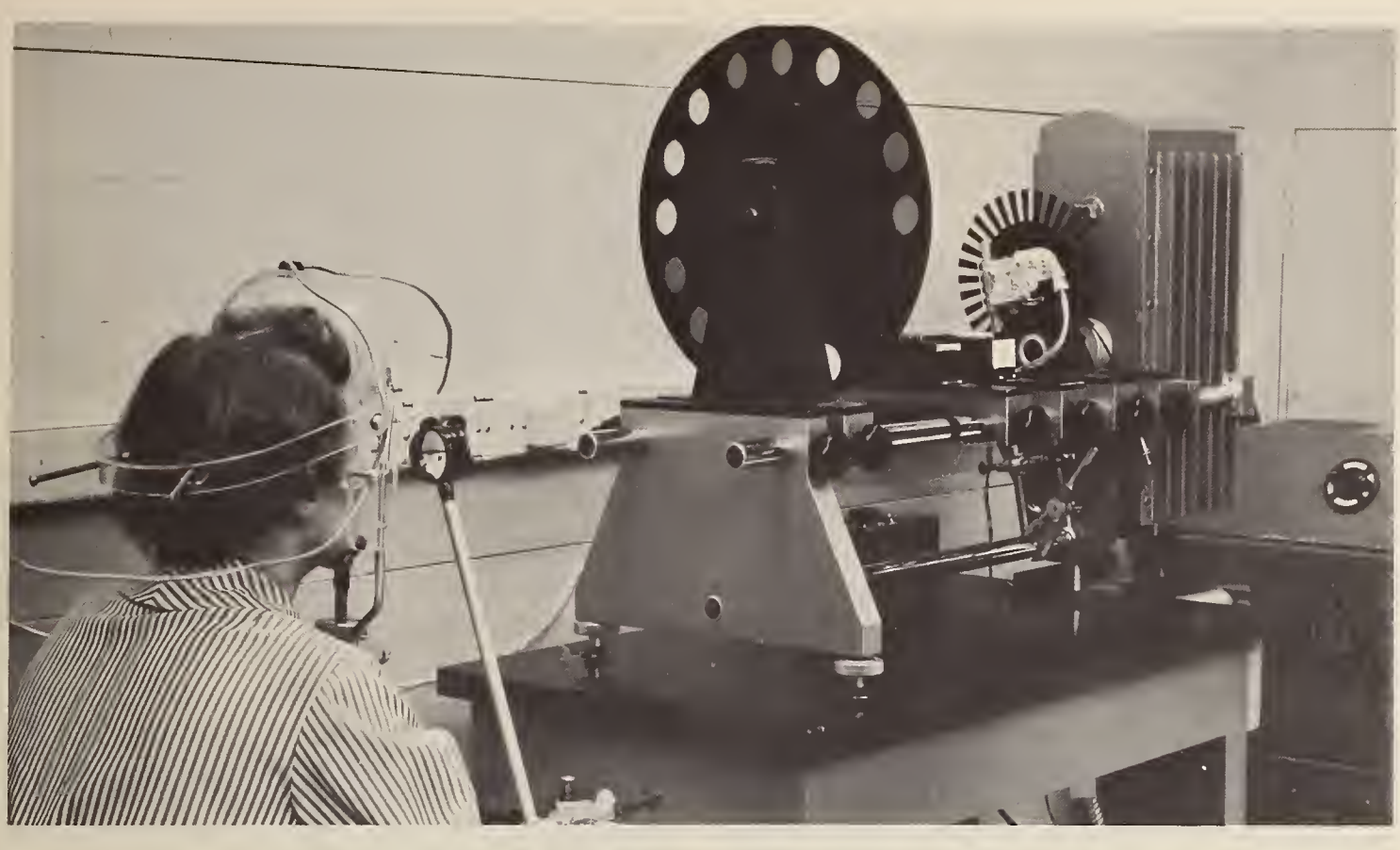
Some 16 hospitals and medical centers are collaborating with the Institute on this pioneering program. Obstetricians, pediatricians, and a dozen other kinds of specialists are working together to make painstaking observations.

This is the first large-scale research project to gather facts on the period of infant development *before* serious ailments appear. Previous studies always had to look back for possible causes *after* cerebral palsy, mental retardation, blindness, or other ailments were diagnosed.

From this widespread, longtime, forward-looking study, scientists hope not only to learn more about known causes, but also to discover previously overlooked causes of neurological ailments.

Other ages than early childhood also have their clusters of neurological diseases. Some, such as epilepsy and encephalitis, affilict persons at any age. Muscular dystrophy may be a problem in later childhood. Adults of the productive years may become helpless from multiple sclerosis, myasthenia gravis, or amyotrophic lateral sclerosis. In the later years, the rate of blindness, deafness, stroke, brain tumors, and Parkinson's disease skyrockets. Institute scientists

Electroencephalograph is being used to measure electrical waves produced by the human brain.



Patient's response to color stimuli is determined objectively by means of the electroretinograph.

search for causes, occurrence, ways of improved diagnosis and treatment, and aways, of course, prevention.

Neurological ailments add up to the leading cause of permanent disability and the third cause of death in the United States.

Institute scientists discovered a safe and reliable test for early brain tumors. Such tumors absorb more of a harmless, short-lived, radioactive test material than normal tissue. Institute biophysicists built a brain scanner which writes a head-shaped pattern in a painless, rapid test locating any concentration of radioactivity indicating a tumor. This test facilitates effective surgery.

Beginnings are being made toward a complete study by electron microscopy of the entire nervous system. Already, an Institute neurocytologist has seen and photographed a hitherto invisible cleft between nerve endings at the nerve junction or synapse. At this region nerve impulses travel from one nerve cell to the next, an essential function for health.

Along with the study of eye disorders such as glaucoma and cataracts, Institute ophthalmologists are making electron microscopy studies of the eye covering, lens, and optic nerve.

Biochemistry, some Institute scientists believe, offers the greatest hope for prevention and treatment of several neurological ailments. For example, an Institute neurochemist discovered how sphingosine, an essential compound in the fatty covering or myelin sheath of nerves, is made in the body. Furthermore, he found a way to synthesize it in the test tube. These discoveries form a step toward the future conquest of multiple sclerosis and related demyelinating disorders.

Epidemiology is increasingly used to study the occurrence of neurological diseases. In multiple sclerosis, for example, in the United States and other countries, many more cases have been found in colder than in warmer climates.

Research grants support both basic and applied research projects comparable to those carried on inside the Institute. One large cooperative study on prevention of cerebrovascular diseases investigated anticoagulant medicines to discourage repeated brain damage from blood clots. Another study sought best ways of controlling the swollen, weakened blood aneurysms which threaten the brain.

In recent years, the number of investigators prepared for neurological research has been increasing with the aid of Institute training grants. This has quickened the tempo of research and is multiplying the possibilities of helpful discoveries.

Clinical Center

THE Clinical Center symbolizes the remarkable increase of public interest in medical research since World War II. Congress in 1947 authorized its establishment to provide clinical study facilities and additional laboratory space at NIH. Construction was begun the following year, and the first patients were admitted on July 6, 1953. The full capacity of the Center is 500 patients and approximately 1,100 laboratory units.

Antedating all scientific specialties, and more important now than ever before, is the study of health and disease in individuals. This is the science of clinical medicine as practiced since ancient times by physicians in homes and hospitals. To a great extent, medical knowledge has grown by just this process. In observing sick humans and attempting to restore their health, physicians are constantly acquiring new evidence concerning the causes of illness, and developing better methods of diagnosis, prevention, and treatment. Today this process of observation and discovery is accelerated by special research facilities such as the Clinical Center.

If medical knowledge is to continue to advance, sharp lines cannot remain between various health problems and scientific approaches. Here is where clinical medicine, which concentrates on the whole man, serves its greatest research mission. The Clinical Center was planned so that representatives of all the medical sciences could work together closely with clinicians, contributing not only to one another's research but also to the more effective treatment of patients. The Center was equipped so that every research tool needed by these workers would be available.

The division of space in the Clinical Center reveals its coordinating function. Each Institute has patient bedrooms and research laboratories in close proximity. The facilities for diagnosis, medical and nursing care, social service, rehabilitation, and recreation are comparable to those found in any good modern hospital. The laboratories are so designed that they can be readily modified to meet the changing requirements of research with a minimum of delay and expense.

That the Clinical Center is more than a hospital is illustrated by the way patients are admitted. Patients are accepted from any part of the country and are received solely because they have a condition needed in a particular study by one of the seven Institutes sharing the Center. They must be referred by individual physicians or other qualified medical sources. Hospitals, clinics, family physicians, and specialists in various diseases not only refer their patients, but through consultation, followup treatment, and observation, actively participate in the research.

Many studies depend upon the patients' remaining in the Center for long periods—often 3 or 4 months. The approximate length of stay is explained to pa-

Modern, semiprivate rooms are available for more than five hundred Clinical Center patients.

tients at the time of admission. It is also understood that they will be discharged back to the care of their own physician when their participation in a study has been completed and when their condition permits. After discharge, followup examinations or treatment may be given periodically for a few months to 10 years or more—a most important procedure in medical investigations. Special facilities for the comfort and morale of patients encourage them to stay for the entire time they are needed and to return to the Center upon request. Patients are not expected to pay for the nursing and medical care received while they are participating in a research project. However, transportation costs are not borne by the Center.

As in every good hospital, the medical and surgical care received here is based on the ruling concept that the welfare of the patient has priority over all other considerations.

The methods of treatment employed are substantially the same as those accepted and used by well-qualified physicians everywhere. Far more extensive and frequent, however, are the laboratory tests and other examinations made for research purposes. All clinical studies are reinforced by fundamental laboratory investigations. Conversely, many laboratory investigations are stimulated and enhanced through the close relations maintained with clinical medicine.

Much of the above is summarized in six basic principles that have guided NIH in its clinical research program:

- The Clinical Center is a research center and not a medical care facility.
- Patients selected as research subjects are given medical care of the highest quality.
- The design and operation of the Center foster interchange of ideas and skills among all the major biological and medical specialties—basic laboratory, preclinical, and clinical.
- Resources of the Center are available for collaborative research by established scientists from other institutions, and opportunity is provided for able young clinicians to gain specialized training for independent careers in research medicine.
- In assembling the staff, every effort is made to minimize the impact on local medical and educational institutions.
- In obtaining patients for study, close collaboration is maintained with physicians, hospitals, medical schools, and clinics—the purpose being not to interfere or compete, but rather to permit medical practice, teaching, and research to proceed together in harmony.

The Clinical Center's two "pools of Bethesda" offer outdoor areas of relaxation for NIH patients.

Spacious solariums in the patient areas of the Clinical Center provide a fine southern view.

Division of General Medical Sciences

THE Division of General Medical Sciences was established in July 1958 to help meet the increased requirements in the NIH programs of grants to non-Federal research institutions. The Division is responsible for supporting research in the general biological and medical sciences and for administering the general research training and fellowship programs. In addition, the Division administers the NIH Center for Aging Research.

Through the Research Grants Branch the Division is supporting studies in a broad spectrum of medical and biological fields. Areas of major program emphasis include:

- Fundamental genetics and human development, including the fields of embryology, teratology, genetics, and fetal physiology.

- Chemistry of life processes, including the fields of biochemistry, metabolism, nutrition, pharmacology, and microbial biochemistry.

- Research in public health and medical care, including epidemiology and biometry, diagnostic preventive and therapeutic measures applicable to population groups, public health nursing, and sanitary engineering.

- Environmental factors in health and disease, including the fields of accident prevention, food toxicology, air and water pollution, occupational medicine, and radiation.

- Clinical and preclinical research into some of the basic problems of medicine, exclusive of research into specific disease problems that are the concern of the other Institutes. This work includes research in anatomy, pathology, anesthesiology, pediatrics, general surgery, orthopedics, obstetrics, gynecology, dermatology, and studies in the treatment of burns and shock.

The Research Training Branch directs two main programs designed to help improve and stabilize the crucial relationship between the Nation's health and its research manpower. Under the Training Program, funds are provided the medical schools and other training institutions to help increase the supply and quality of medical and biological investigators. Regular programs have been established in the fields of pathology, genetrics, embryology and development, pharmacology, biochemistry, epidemiology and biometry, microbiology, physiology, and anatomical sciences.

Under the closely related Research Fellowship Program, funds are provided to aid and improve the flow of competent students through the graduate schools and to expand the opportunities for intensive training at the predoctoral and postdoctoral levels. Fellowships are available under several different programs, including Part-time Student Fellowships, Postsophomore Research Fellowships, Regular Research Fellowships, and Senior Research Fellowships.

Center for Aging Research

As the result of past medical accomplishments, particularly against infectious diseases, more persons than

in the past are living into the older age groups. The majority, however, suffer from ailments which limit their productivity and happiness. In recognition of this problem, the Center for Aging Research has been established by NIH.

The Center directs a program aimed at bringing the full range of research in the biological and behavioral sciences to bear upon the phenomena and problems of aging. In carrying out this program CAR works with all of the Institutes as well as with DGMS.

While NIH has enlarged and extended its own research in aging, the Center for Aging Research is fostering an even greater amount of research through grants to non-Federal scientists and institutions throughout the Nation. Currently, several hundred research projects in aging are receiving support from NIH.

In line with this expanded interest, the Center has encouraged the establishment of large research projects in which many aspects of aging are studied simultaneously at one institution by scientists collaborating on interdisciplinary projects in the biological, behavioral, social, and clinical sciences.

The Center carries out studies to identify areas needing greater research support. It also sponsors conferences, symposia, and seminars on aging research and training problems, and maintains liaison among other Public Health Service and Federal programs in aging.

Because many research projects supported by grants from the seven Institutes at NIH have a bearing on the aging process, all grants are reviewed and classified by the Center for their direct or indirect applicability to current studies in aging. These research projects are classified by CAR in accordance with an outline which includes general gerontology, the structural, physiological, biochemical, psychological and social aspects of aging, identifiable disease processes, and training of research workers in aging. A list of currently active projects in aging is published annually.

Division of Research Grants

THE Public Health Service research grants program in 1946 consisted of a small number of cancer grants. In addition, it was given responsibility for 50 promising research projects that were begun during World War II by the Office of Scientific Research and Development, a war-emergency agency.

The successful completion of the transferred projects, following the spectacular results attained by grant-supported medical and other research for military use during the war, aroused the interest and subsequent support of the Congress. This support, manifested by annually increased appropriations, has evolved a grants program that functions on a national and international level.

Nationally, the Public Health Service program now includes not only some 10,000 research grant awards annually, but about 5,000 awards for fellowships and training grants and $30 million in grants each year for construction of health research facilities throughout the Nation.

On the international level, grants are awarded to support research projects in leading medical centers throughout the world, and promising scientists from other nations are afforded fellowships which provide to them one year's study in U.S. medical research centers.

A major portion of the Public Health Service grant program is coordinated and centrally administered within the Division of Research Grants at the National Institutes of Health.

Research grant applications receive technical review through the Division's Study Sections—consultant groups of non-Federal scientific authorities in the medical or biological sciences. Action to be taken on each application is recommended by the Study Sections to the National Advisory Councils and the Surgeon General of the Public Health Service. The Study Sections also develop and encourage research in neglected areas of the health, medical, or related sciences.

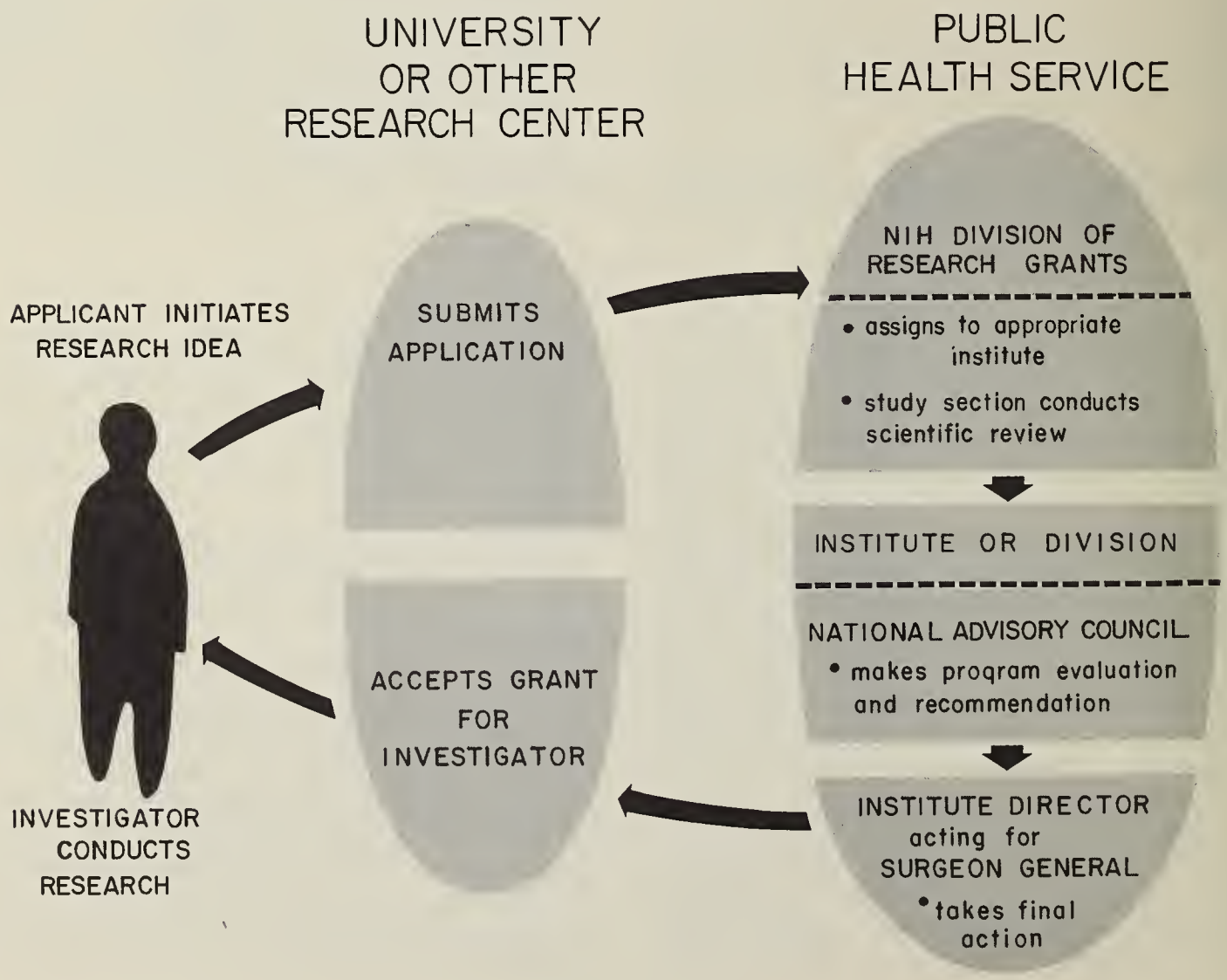
Research fellowships applications are reviewed through a Central Qualifications Board whose recommendations are transmitted to the Specialty Fellowship Board of the Institute in whose field the candidate's interest falls.

Applications for construction grants to help build or equip health research facilities in hospitals, universities, and medical schools are reviewed by the Division of Research Grants. Project site visits are made, and recommendations made to the National Advisory Council for Health Research Facilities.

In the International Fellowships area, a scientific organization within each participating foreign country submits to the Division of Research Grants a list of formally endorsed candidates for the awards. Following divisional review, final selection of fellowship recipients is made by a Fellowship Board comprised of NIH scientists.

For all of these programs, the Division of Research Grants serves as the focal point for receiving and processing all applications, and for paying and auditing all grants and awards. The Division also formulates the plans, policies, and procedures for receiving and processing the applications, and administers patent policies and procedures governing grantee inventions.

In order to help guide medical research planning on local, national, and international levels, the Division conducts an across-the-board statistical analysis program. Information on the status, progress, and direction of each NIH extramural program is provided to administrators at NIH and other Federal agencies, and to the Congress. Through analyses of these data, the Division also reports changing patterns, trends, needs, and accomplishments of research and training programs throughout the United States.


UNIVERSITY OR OTHER RESEARCH CENTER
PUBLIC HEALTH SERVICE
APPLICANT INITIATES RESEARCH IDEA
SUBMITS APPLICATION
NIH DIVISION OF RESEARCH GRANTS
• assigns to appropriate institute
• study section conducts scientific review
INSTITUTE OR DIVISION
NATIONAL ADVISORY COUNCIL
• makes program evaluation and recommendation
INSTITUTE DIRECTOR acting for SURGEON GENERAL
• takes final action
ACCEPTS GRANT FOR INVESTIGATOR
INVESTIGATOR CONDUCTS RESEARCH

Division of Biologics Standards

A researcher scans tissue culture for possible presence of virus during vaccine safety testing.

FEDERAL control of biological products for human use began with the passage of the "Biologics Control Act" in 1902. The present statute, though there have been some changes, is basically the same. It regulates the manufacture and sale of vaccines, toxins, antitoxins, blood derivatives, and analogous products applicable to the prevention and cure of diseases in man.

Many biological products are derived from virulent microorganisms, and all are potentially dangerous if improperly prepared and tested. Close surveillance of production and constant improvement of quality are essential. These are responsibilities of NIH. To meet increasing demands, the Division of Biologics Standards was created in June 1955, replacing the Laboratory of Biologics Control.

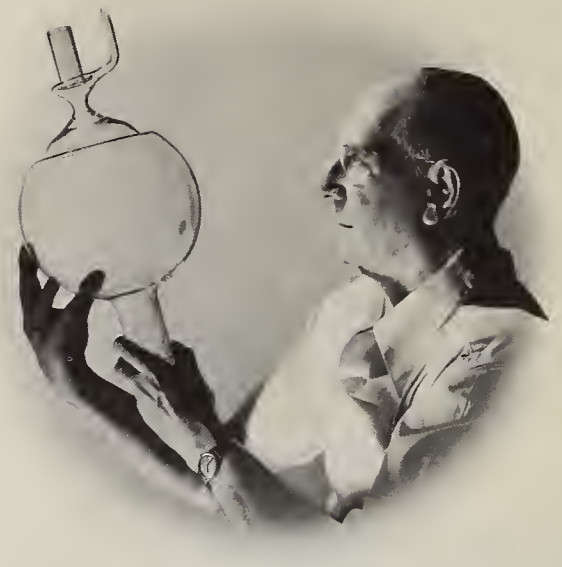
The Act provides for licenses of two types—establishment licenses and product licenses. Biologics produced under the Act can be imported, exported, or placed in interstate commerce only if they meet the Public Health Service's standards of safety, purity, and potency. The manufacturers give wholehearted cooperation to this authority, which insures the greatest benefits with the least risk to the consuming public.

As designated by the Surgeon General, the specific aim of the Division is to develop an organization capable of exerting leadership in the field of biologics, based on the concept that their control should rest on a foundation of research. The staff conducts studies, for example, on the fundamental aspects of bacterial and viral infection. Results are contributing to the development of methods for the control of new products and are helping to improve the older ones. For instance, the Clinical Center Blood Bank, operated by the Division, provides an opportunity to improve techniques of blood collection, processing, and transfusion.

The Division is prepared to meet new needs occasioned by the expanding range of diseases to which biological products are applicable and the accelerated discovery of such products, particularly in the field of virology. The antibiotics and sulfa compounds have made little impression on the common virus infections. But principles utilized in the development of a successful poliomyelitis vaccine offer promise of solutions to such baffling problems as mumps, measles, and influenza. It is anticipated that potent biologics yet to be developed will greatly increase the Division's responsibilities.

The control functions of the Division are to recommend the licensing of manufacturers of biologics, to establish standards for a given product, and to see that such standards are maintained. This third function is performed through regular inspection of the manufacturing plants, review of protocols of the manufacturing process, and testing of the product. The tests employ animal inoculation, tissue culture, and other methods to insure that the requirements for safety, purity, and potency are fulfilled.

Division of Research Services



THE Division of Research Services provides facilities, equipment, and a wide variety of scientific and technical services essential to the needs of the medical investigator and the research administrator at NIH.

Through the fabrication of special research equipment, the achievements of highly skilled technicians employed in the Division are directly linked to major research efforts at NIH.

For example, instrument-makers have contributed to mental health and neurology research by developing an apparatus that first generates electrical pulse trains to stimulate cortical areas in the brain, then displays and photographs the resultant cell discharges on an oscilloscope. They have developed an electrical system whereby sequential functions in clinical pathology can be televised and photographed automatically at precise time intervals.

Plastics research conducted by the Division's medical artists has yielded numerous benefits to NIH in the form of plastic heart valves, museum mounts, psychological testing materials and embedded pathological specimens. A plastic heart pump designed for surgical use is unlike other heart pumps in that it does not require priming with whole blood.

DRS biostatisticians are called on by scientific investigators to help in designing research experiments, for programing the collection of needed information, and for assistance in analyzing the accumulated data. Through their efforts and a centralized statistical processing unit, medical research at NIH is advancing the application of electronic computer concepts beyond the complex computation stage to the rapid recovery of data collected in laboratory and field studies.

Sanitary engineers pioneering in germfree research technology have adapted pilot models of germfree equipment to NIH use and have devised workable methods for sterilizing the air-tight tanks in which germfree animals are reared. They also contribute to the high standard of laboratory sanitation at NIH by recommending effective methods of controlling air pollution and by providing distilled and de-ionized waters.

For a constant source of healthy laboratory animals, NIH relies on the Division's animal hospital and on the advice of DRS veterinarians for the treatment of infectious animal diseases. Thousands of animals are bred each year for the study of the diseases that afflict mankind, and many others are obtained through international sources. Scientists order conventional and exotic species of laboratory animals from the Division's animal colony, and replenish their supply of glassware and culture media from another laboratory service.

Medical photographers in the Division contribute to the visual documentation of research, and science editors, translators, reference librarians, and other specialists help the research investigator communicate his findings to the scientific world. The NIH library is one of the world's leading medical libraries, geared to assist the scientist in tracking down obscure clues to research problems.

Maintenance of NIH buildings and grounds, planning and engineering the construction of new buildings, and the remodeling of existing structures are other responsibilities of the Division of Research Services.

An electronic computer system serves medical research by speeding analyses of scientific data.

Caretaker checks the health of one of the many animals raised for research purposes by the DRS animal colony.

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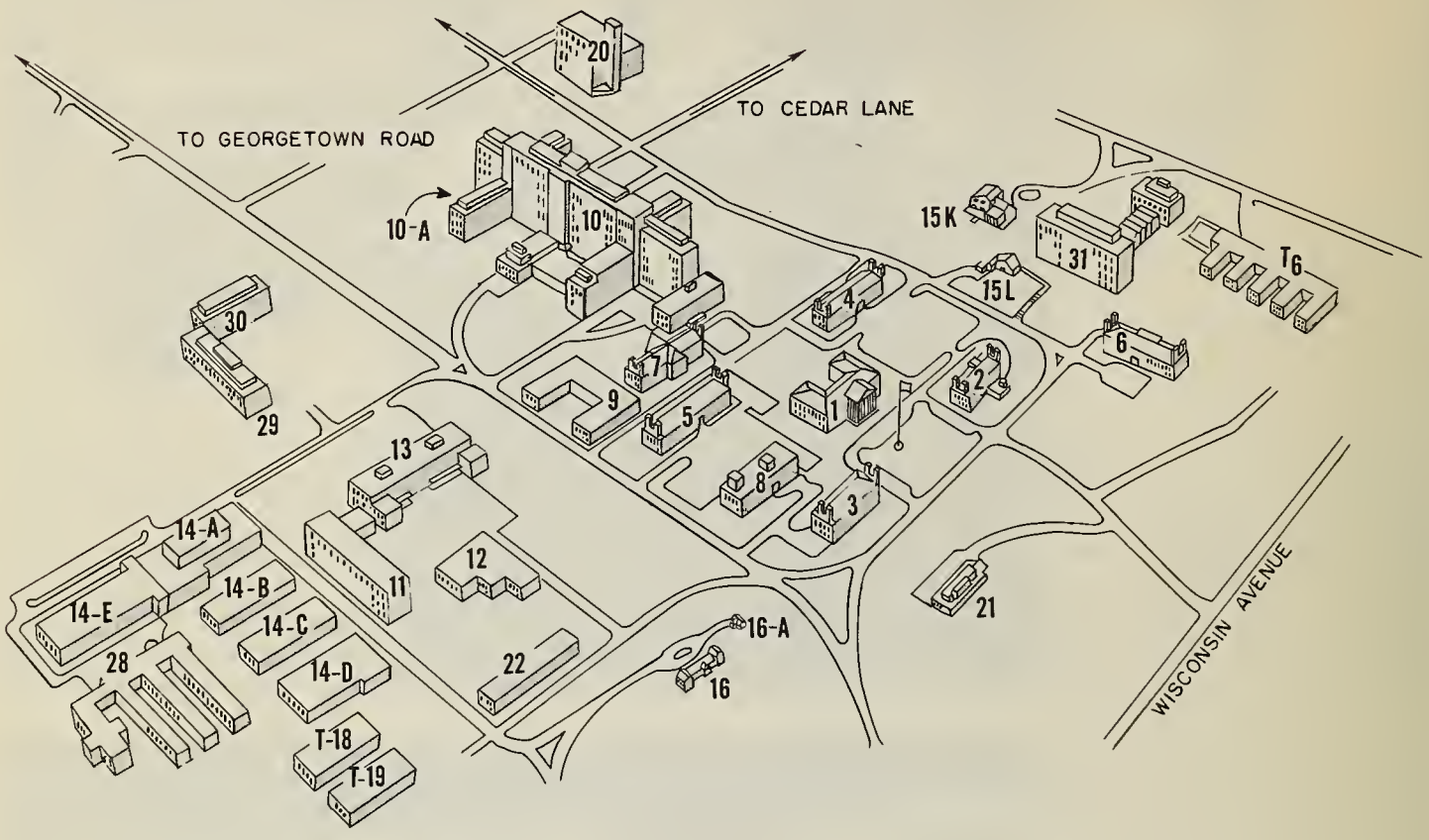
Directory of Buildings



1	Administration
2	Dental, arthritis and metabolic research
3	Heart, arthritis and metabolic research
4	Arthritis and metabolic research
5	Allergy and infectious diseases research, biologics standards
6	Cancer research
7	Memorial Laboratory—allergy and infectious diseases research
8	Neurological, allergy and infectious diseases research; biologics standards
9	Neurological, mental health research
10	Clinical Center
10A	Surgical wing—new construction
11	Boiler plant
12	General utility, central services, storage
13	Laundry, supply, central services
14A–E	Animal production
15K	Wilson House—civil service examiners
15L	Top Cottage
16	Stone House—general medical sciences
16A	Offices
20	Apartment house (quarters)
21	Isotope laboratory
22	Grounds maintenance building
28	Animal hospital—kennels
29	Biologics standards
30	Dental laboratories—new construction
31	General office building—new construction
T6	Offices (grants and fellowships)
T18	Offices (mental health research)
T19	Offices (cancer research)

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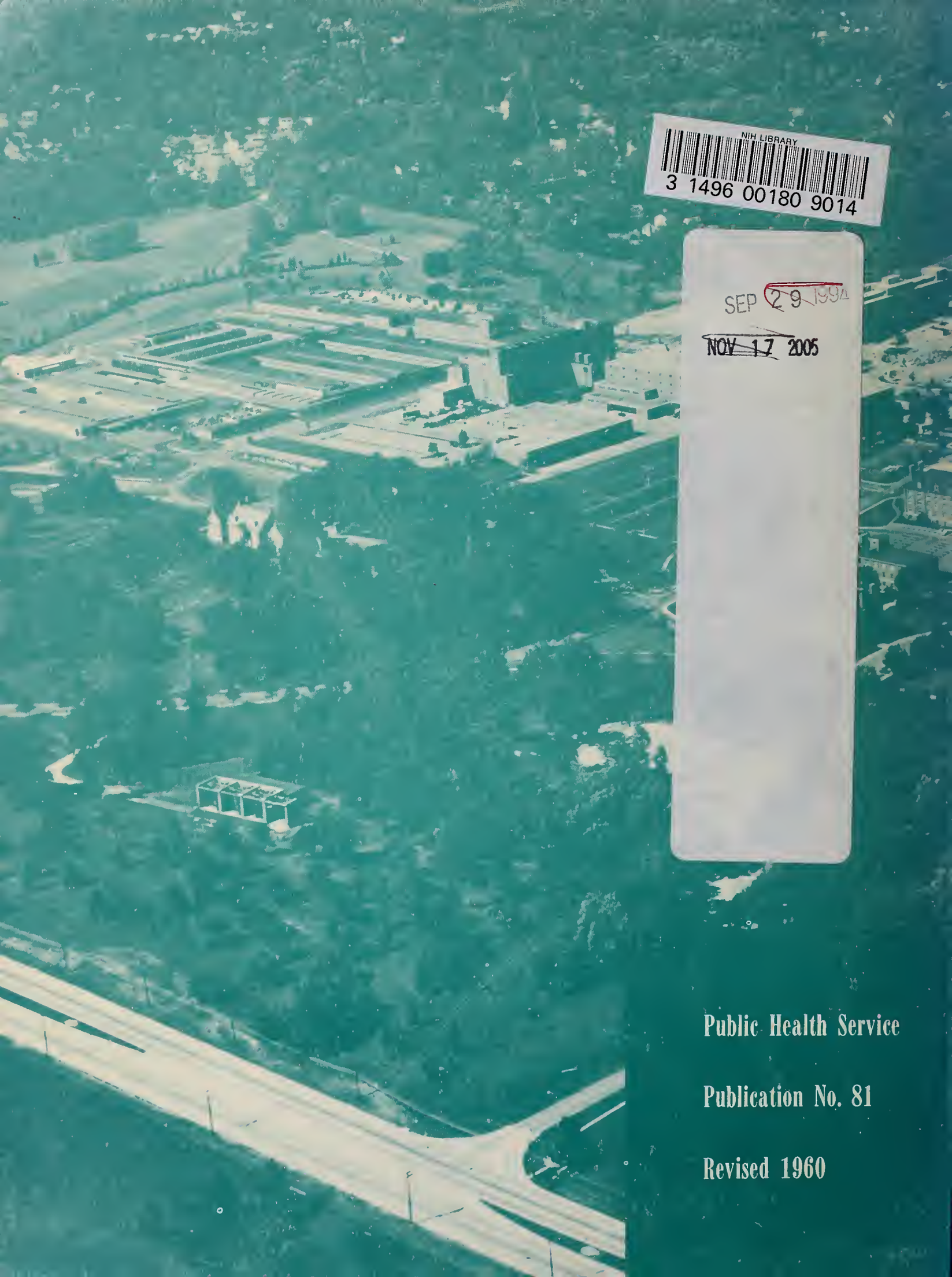

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